CLAIMS

1. A macro-pixel used in an image rendering process for forming an image using a matrix of said macro-pixels, said macro-pixel having a plurality of rectilinear parallel rows, all said rows extending across said matrix in the same direction, each one of said rows capable of at least partially adopting an on state and an off state, wherein said on state includes presence of color and said off state includes absence of color.

2. The macro-pixel as in claim 1, wherein said on state comprises a key color state and a non-key color state.

3. The macro-pixel as in claim 2, wherein said non-key color state comprises at least one color selected from the group consisting of cyan, magenta, and yellow.

4. The macro-pixel as in claim 1, wherein all said rows in at least partially same state are adjacently grouped.

5. The macro-pixel as in claim 4, wherein said matrix forms a pattern whereby a maximal parallel distance exists between rows in said non-key color state and rows in said key color state.

6. The macro-pixel as in claim 2, wherein said key color state comprises at least one of the color black and a darkest color in a possible selection of color states.

7. The macro-pixel as in claim 6, wherein said non-key color state comprises at least one color selected from the group consisting of cyan, magenta, and yellow.

8. The macro-pixel as in claim 7, wherein each row comprises at least one micro-pixel forming rectilinear parallel columns across said matrix in a direction perpendicular to said rows.

9. The macro-pixel as in claim 8, wherein each said micro-pixel is capable of adopting said on state and said off state.

10. The macro-pixel as in claim 9, wherein said micro-pixels are capable of adopting said on state according to a first predetermined order.

11. The macro-pixel as in claim 10, wherein said first predetermined order is different for said non-key color state and said key color state.

12. The macro-pixel as in claim 10, further comprising upper and lower edges and wherein said first predetermined order begins with one of said micro-pixels in a row located at a substantial equidistance from said upper and lower edges thereby defining a first order micro-pixel.

13. The macro-pixel as in claim 12, further comprising left and right edges and wherein said first order micro-pixel is in a position at a substantial equidistance from said left and right edges.

14. The macro-pixel as in claim 13, wherein said first predetermined order continues with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

15. The macro-pixel as in claim 14, wherein, after all micro-pixels in a row have adopted said on state, said first predetermined order further continues, in a row which is the next one closest to substantial upper and lower edge equidistance, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

16. The macro-pixel as in claim 15, wherein said micro-pixels are capable of adopting said on state according to a second predetermined order, wherein said on state in said first predetermined order corresponds either one of said non-key color state and said key color state and wherein said

on state in said second predetermined order corresponds to the other one of said non-key color state and said key color state.

17. The macro-pixel as in claim 16, wherein said second predetermined order begins with one of said micro-pixels in a row closest to one of said upper and said lower edges thereby defining a second order micro-pixel.

18. The macro-pixel as in claim 17, wherein said second order micro-pixel is in position at a substantial equidistance from said left and right edges.

19. The macro-pixel as in claim 18, wherein said second predetermined order continues with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

20. The macro-pixel as in claim 19, wherein, after all micro-pixels in a row have adopted said on state, said second predetermined order further continues, in a row which is next one closest to the other one of said upper and said lower edges, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

21. The macro-pixel as in claim 9, wherein said macro-pixels form odd and even numbered horizontal lines of said matrix, further wherein said micro-pixels in said odd lines are capable of adopting said on state according to one of a first predetermined order and a second predetermined order, and said even lines are capable of adopting said on state according to the other one of a first predetermined order and a second predetermined order.

22. The macro-pixel as in claim 21, further comprising upper and lower edges and wherein said first predetermined order begins with one of said micro-pixels in a row closest to said upper edge thereby defining a first

order micro-pixel, and said second predetermined order begins with one of said micro-pixels in a row closest to said lower edge thereby defining a second order micro-pixel.

23. The macro-pixel as in claim 22, further comprising left and right edges and wherein said first and second order micro-pixels are in a position at a substantial equidistance from said left and right edges.

24. The macro-pixel as in claim 23, said first and second predetermined orders continue, in their respective rows, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

25. The macro-pixel as in claim 24, wherein, after all micro-pixels in a row have adopted said on state, said first predetermined order further continues, in a row which is next one closest to said upper edge, and wherein said second predetermined order further continues, in a row which is next one closest to said lower edge, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

26. The macro-pixel as in claim 1, wherein each row comprises at least one micro-pixel forming rectilinear parallel columns across said matrix in a direction perpendicular to said rows.

27. The macro-pixel as in claim 26, wherein said micro-pixels are capable of adopting said on state in a predetermined order.

28. The macro-pixel as in claim 1, wherein said image rendering process comprises a printing process comprising a continuous linear production direction and wherein direction of said rows is dependent on said continuous linear production direction.

29. The macro-pixel as in claim 28, wherein said row direction is perpendicular to said continuous linear production direction.

30. The macro-pixel of claim 1, further comprising parallel upper and lower edges and wherein direction of said rows relative said upper and lower edges is selected from the group consisting of 0 degrees, 90 degrees, 26.565051177 degrees, 45 degrees, and 63.434948823 degrees.

31. An image rendering method for forming an image, said method comprising:

providing a matrix of macro-pixels, each said macro-pixel having a plurality of rectilinear parallel rows, all said rows extending across said matrix in the same direction; and

each one of said rows adopting, at least partially, at least one of an on state and an off state, wherein said on state includes presence of color and said off state includes absence of color, to thereby render said image.

32. The method as in claim 30, wherein adopting said on state comprises adopting a key color state and a non-key color state.

33. The method as in claim 32, wherein adopting said non-key color state comprises adopting at least one color selected from the group consisting of cyan, magenta, and yellow.

34. The method as in claim 30, further comprising adjacently grouping all said rows in at least partially same state.

35. The method as in claim 34, further comprising forming a pattern whereby a maximal parallel distance exists between rows in said non-key color state and rows in said key color state.

36. The method as in claim 32, wherein adopting said key color state comprises adopting at least one of the color black and a darkest color in a possible selection of color states.

37. The method as in claim 36, wherein adopting said non-key color state comprises adopting at least one color selected from the group consisting of cyan, magenta, and yellow.

38. The method as in claim 37, wherein each row comprises at least one micro-pixel forming rectilinear parallel columns across said matrix in a direction perpendicular to said rows, and wherein adopting said on state and said off state further comprises each said micro-pixel adopting at least one of said on state and said off state.

39. The method as in claim 38, wherein said micro-pixels adopt said on state according to a first predetermined order.

40. The method as in claim 39, wherein said first predetermined order is different for said non-key color state and said key color state.

41. The method as in claim 39, further comprising determining a row located at a substantial equidistance from an upper edge and a lower edge of said macro-pixel, and wherein said first predetermined order begins with one of said micro-pixels in said upper and lower edge equidistant row thereby defining a first order micro-pixel.

42. The method as in claim 41, further comprising determining a position at a substantial equidistance from a left edge and a right edge of said macro-pixel, and wherein said first predetermined order begins with said first order micro-pixel in said left and right edge equidistant position.

43. The method as in claim 42, further comprising continuing said first predetermined order with the micro-pixel in said off state which is closest

to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

44. The method as in claim 43, wherein, after all micro-pixels in a row have adopted said on state, further continuing said first predetermined order, in a row which is the next one closest to substantial upper and lower edge equidistance, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

45. The method as in claim 44, wherein said micro-pixels adopt said on state according to a second predetermined order, wherein said on state in said first predetermined order corresponds either one of said non-key color state and said key color state and wherein said on state in said second predetermined order corresponds to the other one of said non-key color state and said key color state.

46. The method as in claim 45, further comprising determining a row closest to either one of said upper and said lower edges thereby defining a second order micro-pixel, and wherein said second predetermined order begins with one of said micro-pixels in said row closest to either one of said upper and lower edges.

47. The method as in claim 46, further comprising determining a position at a substantial equidistance from a left edge and a right edge of said macro-pixel, and wherein said second predetermined order begins with said second order micro-pixel in said left and right edge equidistant position.

48. The method as in claim 47, further comprising continuing said second predetermined order with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

49. The method as in claim 48, wherein, after all micro-pixels in a row have adopted said on state, further continuing said second predetermined order, in a row which is next one closest to the other one of said upper and said lower edges, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

50. The method as in claim 38, wherein said macro-pixels form odd and even numbered horizontal lines of said matrix, further wherein said micro-pixels in said odd lines adopt said on state according to one of a first predetermined order and a second predetermined order, and said even lines adopt said on state according to the other one of a first predetermined order and a second predetermined order.

51. The method as in claim 50, wherein said first predetermined order begins with one of said micro-pixels in a row closest to an upper edge of said macro-pixel thereby defining a first order micro-pixel, and said second predetermined order begins with one of said micro-pixels in a row closest to a lower edge of said macro-pixel thereby defining a second order micro-pixel.

52. The method as in claim 51, further comprising determining a position at a substantial equidistance from a left edge and a right edge of said macro-pixel, and wherein said first predetermined order begins with said first order and second order micro-pixels in said left and right edge equidistant position.

53. The method as in claim 52, further comprising continuing said first and second predetermined orders, in their respective rows, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance until all micro-pixels in a row have adopted said on state.

54. The method as in claim 53, wherein, after all micro-pixels in a row have adopted said on state, further continuing said first predetermined order, in a row which is next one closest to said upper edge, and wherein said second predetermined order further continues, in a row which is next one closest to said lower edge, with the micro-pixel in said off state which is closest to said substantial left and right edge equidistance.

55. The method as in claim 30, further comprising printing said image.

56. The method as in claim 55, wherein said printing comprises producing said image in a direction of production and wherein direction of said rows is dependent on said direction of production.

57. The method as in claim 56, wherein said row direction is perpendicular to said continuous linear production direction.

58. The method as in claim 31, wherein each said provided a macro-pixel further comprises parallel upper and lower edges and wherein direction of said rows relative said upper and lower edges is selected from the group consisting of 0 degrees, 90 degrees, 26.565051177 degrees, 45 degrees, and 63.434948823 degrees.

59. The method as in claim 30, further comprising encoding digital data within said image.

60. The method as in claim 58, wherein said encoding digital data comprises encoding watermark data.

61. The method as in claim 58, wherein encoding said digital data comprises replacing said image forming macro-pixels with said digital data.

62. The method as in claim 61, wherein encoding said digital data comprises modulating said image forming macro-pixels with said digital data.

63. The method as in claim 62, wherein adopting said on state comprises adopting at least one of a key color state and a non-key color state.

64. The method as in claim 63, wherein adopting said non-key color state comprises adopting at least one color selected from the group consisting of cyan, magenta, and yellow.

65. The method as in claim 64, wherein modulating comprises using said at least one color.